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09/921,925	08/06/2001	Makoto Kitano	520.40466X00	8568

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EXAMINER

LEA EDMONDS, LISA S

ART UNIT	PAPER NUMBER
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2835

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Please find below and/or attached an Office communication concerning this application or proceeding.

## Interview Summary

Application No.

09/921,925

Applicant(s)

KITANO ET AL.

Examiner

Lisa Lea-Edmonds

Art Unit

2835

All participants (applicant, applicant's representative, PTO personnel):

(1) Lisa Lea-Edmonds.

(3) Mr. Nakagawara.

(2) Mr. Kraus.

(4) Mr. Ohashi.

Date of Interview: 15 July 2003.

Type: a) ☐ Telephonic b) ☐ Video Conference

c) ☒ Personal [copy given to: 1) ☒ applicant 2) ☒ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☒ No.

If Yes, brief description: \_\_\_\_\_.

Claim(s) discussed: 1-22.

Identification of prior art discussed: Nakagawa et al. (6519148), Ohashi et al. (5646824).

Agreement with respect to the claims f) ☒ was reached. g) ☐ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: The examiner has agreed to further consider applicant's invention in light of the interview.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

  
Examiner's signature, if required

**PROPOSED AMENDMENTS FOR INTERVIEW**

**IN THE CLAIMS:**

Please amend claims 1, 5, 8 and 10 as shown below, and please cancel claim 11 without prejudice or disclaimer of the subject matter thereof.

1. (currently amended) A liquid cooling system, comprising:

a circulation pump of the pulsation type for circulating cooling liquid therethrough including an input portion for receiving cooling liquid and a separate output portion for supplying cooling liquid;

a heat receiving jacket supplied with said cooling liquid and disposed to receive heat generated from a heat generating body;

a heat radiation ~~pipe-portion~~ for radiating heat which is supplied by the cooling liquid passing through said heat receiving jacket; and

a ~~passage-member~~ for circulating the cooling liquid passing through said heat radiation ~~pipe-portion~~ into said pump so that said cooling liquid circulates within a closed flow passage, wherein

$\Delta V_s$  is equal to or greater than  $\Delta V_p$ , with the inner volume change when said pump emits a pulsation therefrom being represented by  $\Delta V_p$ , the pressure caused by said volume change being represented by  $P$ , and the volume change due to said pressure  $P$  which occurs in the flow passage of the cooling liquid, other than in said pump, being represented by  $\Delta V_s$ .

2. (previously amended) A liquid cooling system as defined in claim 1, further comprising an accumulator, in which the volume change of the cooling liquid in the accumulator due to said pressure  $P$  is equal to or greater than  $\Delta V_p$ .

3. (previously amended) A liquid cooling system as defined in the claim 1, wherein said cooling liquid is pressurized at a pressure that is equal to or greater than that of the atmosphere.

4. (previously amended) A liquid cooling system as defined in the claim 2, wherein said accumulator comprises a supply opening for supplying said circulating cooling liquid therethrough and a discharge opening for discharging said cooling liquid therethrough, and a chamber that maintains gas and said cooling liquid therein.

5. (currently amended) A personal computer, comprising:

a semiconductor element;

a signal input portion;

a display device; and

a liquid cooling system, including:

a circulation pump for circulating cooling liquid therethrough including an input portion for receiving cooling liquid and a separate output portion for supplying cooling liquid;

a heat receiving jacket supplied with said cooling liquid and positioned to receive heat generated within said semiconductor element;

a heat radiation ~~pipe~~ portion for radiating heat which is supplied by the cooling liquid passing through said heat receiving jacket; and

a ~~passage-member~~ for circulating the cooling liquid passing through said heat radiation ~~pipe~~ portion into said pump so that said cooling liquid circulates within a closed flow passage, wherein

$\Delta V_s$  is equal to or greater than  $\Delta V_p$ , with the inner volume change when said pump emits the cooling liquid therefrom being represented by  $\Delta V_p$ , the pressure

caused by said volume change being represented by  $P$ , and the volume change due to said pressure  $P$  which occurs in the flow passage of the cooling liquid, other than in said pump, being represented by  $\Delta V_s$ .

6. (previously amended) A personal computer as defined in the claim 5, wherein said liquid cooling system further comprises an accumulator, in which the volume change of the cooling liquid in the accumulator due to said pressure  $P$  is equal to or greater than  $\Delta V_p$ .

7. (previously amended) A personal computer as defined in the claim 5, wherein said cooling liquid is pressurized at a pressure that is equal to or greater than that of the atmosphere.

8. (currently amended) A personal computer, comprising:  
a main body including a semiconductor element and a signal input portion;  
a display device having a display portion connected with said main body through a movable mechanism; and  
a liquid cooling system, including:  
a circulation pump for circulating cooling liquid therethrough including an input portion for receiving cooling liquid and a separate output portion for supplying cooling liquid;  
a heat receiving jacket disposed within said main body and supplied with said cooling liquid, said heat receiving jacket being positioned to receive heat generated within said semiconductor element;  
a heat radiation ~~pipe~~ portion being disposed on a back surface of said display portion of said display device for radiating heat which is supplied by the cooling liquid passing through said heat receiving jacket;

a ~~passage-member~~ for circulating the cooling liquid passing through said heat radiation ~~pipe-portion~~ into said pump so that said cooling liquid circulates within a closed flow passage; and

an accumulator connected to said closed flow passage and having a supply opening for supplying said circulating cooling liquid therethrough, a discharge opening for discharging said cooling liquid therethrough, and a chamber that maintains gas and said cooling liquid therein, wherein

the amount of the cooling liquid maintained within said accumulator changes in response to emission of the cooling liquid from said pump.

9. (previously amended) A personal computer as defined in the claim 8, wherein  $\Delta V_s$  is equal to or greater than  $\Delta V_p$ , with the inner volume change when said pump emits the cooling liquid therefrom being represented by  $\Delta V_p$ , the pressure caused by said volume change being represented by P, and the volume change due to said pressure P in the flow passage of the cooling liquid, other than said pump, being represented by  $\Delta V_s$ .

10. (currently amended) A personal computer, comprising:

a semiconductor element;

a signal input portion;

a display device; and

a liquid cooling system, including:

an emission circulation pump for circulating cooling liquid therethrough including an input portion for receiving cooling liquid and a separate output portion for supplying cooling liquid;

a heat receiving jacket supplied with said cooling liquid and positioned to receive heat generated within said semiconductor element;

a heat radiation ~~pipe~~portion for radiating heat which is supplied by the cooling liquid passing through said heat receiving jacket;

an accumulator having a supply opening for supplying said circulating cooling liquid therethrough, a discharge opening for discharging said cooling liquid therethrough, and a chamber for maintaining gas and said cooling liquid therein; and

a ~~passage~~member for circulating the cooling liquid passing through said heat radiation ~~pipe~~portion into said pump so that said cooling liquid circulates within a closed flow passage, wherein

the amount of cooling liquid maintained within said accumulator changes in response to emission of the cooling liquid from said pump.

Claim 11 (canceled)

12. (previously amended) A liquid cooling system as defined in claim 2, wherein plural pumps are connected in series in said flow passage.

13. (previously amended) A liquid cooling system as defined in claim 12, wherein two of said plural pumps are operated to respectively produce emission of said cooling liquid that are 180° different in phase from each other.

14. (previously amended) A liquid cooling system as defined in claim 13, wherein said pumps emit the cooling liquid by the reciprocal movement of the member in said pump is caused by bending or flexible of a diaphragm.

15. (original) A liquid cooling system as defined in claim 1, wherein at least a portion of the circulating passage for carrying said cooling liquid therein is formed of a flexible material.

16. (original) A liquid cooling system as defined in claim 1, wherein the cooling liquid in said closed flow passage is pressurized at a pressure higher than atmospheric pressure.

17. (original) A liquid cooling system as defined in claim 16, wherein at least a portion of said circulating passage is formed of a rubber or resin material and said portion is coated with a metal film.

Please add the following new claims:

18. (new) A liquid cooling system, comprising:

a circulation pump for circulating cooling liquid therethrough including an input portion for receiving cooling liquid and a separate output portion for supplying cooling liquid;

a heat receiving jacket supplied with said cooling liquid from said pump and disposed to receive heat generated from a heat generating body;

a heat radiation portion for radiating heat which is supplied by the cooling liquid passing through said heat receiving jacket;

a member for circulating the cooling liquid passing through said heat radiation portion into said pump so that said cooling liquid circulates within a closed flow passage; and

an accumulator disposed along said closed flow passage.

19. (new) A liquid cooling system as defined in the claim 18, wherein said cooling liquid is pressurized at a pressure that is equal to or greater than that of the atmosphere.



20. (new) A liquid cooling system as defined in the claim 18, wherein said accumulator comprises at least one opening for at least one of supply and discharge of said circulating cooling liquid, and a chamber that maintains gas and said cooling liquid therein.

21. (new) A liquid cooling system as defined in the claim 20, wherein said accumulator is disposed along said closed flow passage from said heat radiation portion to said heat receiving jacket.

22. (new) A liquid cooling system as defined in the claim 20, wherein said at least one opening of said accumulator includes a supply opening for supplying said circulating cooling liquid therethrough and a discharge opening for discharging said cooling liquid therethrough.